

EEU 2 - 1023

Thomas E. Roy, P.E. Peter J. McGlew, P.G. Michael P. Donahue, P.E. George G. Draper Joseph M. Vercellotti, P.E.

February 18, 1993 File 92070

Ms. Cindy Woods Department of Environmental Conservation Hazardous Materials Management Division Site Management Section 103 South Main Street West Building Waterbury, Vermont 05676-0404

> Re: Preliminary Soil and

> > Ground Water Assessment

Citgo Station 51 Portland Street St. Johnsbury, Vermont

Dear Ms. Woods:

On behalf of the C.N. Brown Company (C.N. Brown), Aries Engineering, Inc. (Aries) has enclosed one copy of the preliminary soil and ground water assessment report for the C.N. Brown Citgo Station (site) located at 51 Portland Street in St. Johnsbury, Vermont.

Please contact the undersigned at (603) 226-2545 with any additional questions you may have.

Sincerely,

Aries Engineering, Inc.

Peter J. McGlew, P.G.

Peter J. me Dlew

Project Reviewer

ojéct Engineer

cc: Mr. Kevin Moore - C.N. Brown Company

Enclosure: Preliminary Soil and Ground Water Assessment Report

UNDERGROUND STORAGE TANK CLOSURE PRELIMINARY SOIL AND GROUND WATER ASSESSMENT C.N. BROWN COMPANY CITGO STATION ST. JOHNSBURY, VERMONT

Prepared for: Mr. Kevin Moore C.N. Brown Company PO Box 200 South Paris, ME

Prepared by:
Aries Engineering, Inc.
46 South Main Street
Concord, New Hampshire
(603)226-2545

January 1993 File No. 92070

Peter J. McGlew, C.G.W.P., P.G.

Project Reviewer

Joseph M. Vercellotti, P.E.

Prøject Engineer

TABLE OF CONTENTS

SEC	TION		PAGE
1.0	INT	RODUCTION	1
2.0	SITI	E DESCRIPTION	1
3.0	FILI	E REVIEW	2
	3.1 3.2	Local Files State ANR-DEC Files	2 3
4.0	SITE	E RECONNAISSANCE	5
	4.1 4.2	Site Grounds Site Garage and Office Building Interior	5 6
5.0	TES	T BORINGS AND MONITORING WELL INSTALLATIONS	6
6.0	GRO	OUND WATER SAMPLING AND ANALYSIS	7
	6.1 6.2	Ground Water Sampling Laboratory Analytical Results	7 7
7.0	DAT	'A ANALYSIS	8
	7.1 7.2 7.3 7.4 7.5 7.6 7.7 7.8	Overburden Subsurface Conditions Estimated Ground Water Flow Directions Overburden Hydraulic Gradient Effective Porosity Overburden Hydraulic Conductivities Estimated Ground Water Flow Velocity Site Ground Water VOC Distribution Potential Contaminant Migration Paths	8 9 9 9 9 10
8.0	ASSI	ESSMENT SUMMARY AND RECOMMENDATIONS	11
	8.1 8.2	Assessment Summary Recommendations	11 13
9.0	REP(ORT LIMITATIONS	13

TABLES

Table 1 November 1992 Ground Water Level Data

Table 2 Ground Water Gasoline-Related VOC Concentrations

FIGURES

Figure 1 Locus Plan Figure 2 Site Plan

Figure 3 Ground Water Elevation Contour Plan

Figure 4 Ground Water Volatile Organic Compound (VOC) Concentration Plan

APPENDICES

Appendix A Soil Boring Logs

Appendix B Laboratory Analytical Results
Appendix C Hydraulic Conductivity Test Data

UNDERGROUND STORAGE TANK CLOSURE PRELIMINARY SOIL AND GROUND WATER ASSESSMENT

C.N. Brown - Citgo Station 51 Portland Street St. Johnsbury, Vermont

INTRODUCTION

On behalf of the C.N. Brown Company (C.N. Brown), Aries Engineering, Inc. (Aries) conducted a preliminary soil and ground water assessment (assessment) at the C.N. Brown Citgo Station site (site) located at 51 Portland Street in St. Johnsbury, Vermont. The approximate site locus is shown on Figure 1. Aries conducted the assessment in response to a July 16, 1992 State of Vermont Agency of Natural Resources (ANR), Department of Environmental Conservation (DEC), Sites Management Section (SMS) site investigation request and Aries' September 18, 1992 work scope approved by the ANR-DEC-SMS. This assessment is subject to the limitations presented in Section 9.0.

The assessment objectives were to assess site soil and ground water quality consistent with ANR-DEC ground water protection rules. Aries conducted the following tasks to meet the site assessment objectives:

- a site reconnaissance;
- a review of available Vermont ANR-DEC-SMS underground storage tank (UST) and hazardous waste files and St. Johnsbury town files for information relative to the presence of hazardous waste on or immediately abutting the site;
- five site test boring and monitoring well installations;
- ground water level observations and checked for free product in the five site monitoring wells;
- two rising head permeability tests to estimate shallow site overburden hydraulic conductivity; and
- collected five site ground water samples for volatile organic compound (VOC) analyses by EPA Method 602.

2.0 - SITE DESCRIPTION

The site is located on the south side of Portland Street (Route 2) approximately 1/4 mile west of Railroad Street in St. Johnsbury, Vermont. The site consists of approximately 13,500 square feet of commercial land with an approximately 60-foot by 90-foot garage, warehouse and office building centrally located on the site. A gasoline pump island is located north of the site building. Pertinent site features are depicted on Figure 2.

The site is abutted to the south by residential property owned by R. Dimick and T. Monty; to the west by the Wooden Horse Restaurant owned by G. Quatrini and residential property owned by R. Barnett; to the north by Portland Street, which is in turn abutted by residential property and Elm Street; and to the east by Wright Avenue, which is in turn abutted by residential property owned by B. Herzog and J. Gammel.

Available ANR-DEC files and C.N. Brown representatives indicated that the site currently has three 6,000 gallon (gal.) gasoline USTs located north of the site building and one 1,000 gal, used oil UST located east of the site building. A more detailed site fuel handling facility description is included in Section 3.2.

3.0 - FILE REVIEW

As part of this assessment, available ANR-DEC and local files were reviewed for information that indicates the presence of hazardous waste or USTs on or immediately abutting the site. A discussion of the ANR-DEC and local file review follows.

3.1 - Local Files

Aries reviewed available local files at the St. Johnsbury Tax Assessor's Office, Public Works Office, and Fire Department. Information provided by the Assessor's Office indicated the site is designated as Map 24, Block 4, Lot 4 and was transferred from Murphy Realty Company, Inc. to the C.N. Brown Company prior to December 31, 1965. The local files indicated that the site was transferred to the Murphy Realty Company from Murphy Motor Sales prior to 1965. The local files did not indicate the ownership history prior to Murphy Motor Sales. The Assessor's Office information made available to Arics did not indicate that oil or hazardous material has been treated, stored or disposed on the site.

Aries contacted the St. Johnsbury Department of Public Works (DPW) and Fire Department for information which may indicate the presence of hazardous waste or USTs either on or abutting the site. The St. Johnsbury Fire Chief and Superintendent of Public Works indicated that the city does not keep records of information regarding the presence of oil, hazardous material or USTs.

Aries contacted St. Johnsbury Water Department representatives for information regarding water supply wells and sewage disposal in the site vicinity. St. Johnsbury Water Department representatives indicated that homes and businesses in the site vicinity are serviced by the municipal water and sewer systems. According to water department representatives, the St. Johnsbury town water supply is Stiles Pond Reservoir which is located off of Route 18, approximately two miles east of the site.

Aries also reviewed the available Sanborn Fire Insurance maps (fire insurance maps) of the site vicinity for the period from 1895 to 1927. The maps indicated the site was undeveloped prior to 1919. The maps indicated that during the 1920's the site was used as a gasoline station and automobile service garage. The western part of the site building was used as a bowling alley in 1927. The available fire insurance maps did not contain site history information beyond 1927 or indicate the presence of USTs on properties adjacent to the site.

3.2 - State ANR-DEC Files

Aries reviewed selected ANR-DEC files for information which may indicate the presence of hazardous waste or USTs on or immediately abutting the site. ANR-DEC files made available to Aries included the Vermont Hazardous Site List, the DEC Hazardous Materials Management Division Spills Data Base Listing, the DEC-SMS UST inventory, the DEC Hazardous Waste Generator List and the Solid Waste Management Division (SWMD) files. A discussion of available ANR-DEC file information follows.

ANR-DEC UST Files

The ANR-DEC files contained former site UST information. A summary of the ANR-DEC former site UST information made available to Aries follows:

Number of Tanks	Contents	Capacity Gallons	Approximate Tank Age (Years)
2	gasoline	2,000	unknown
1	gașoline	1,000	unknown
<u>l</u>	waste oil	2 ,000	unknown

According to the available ANR-DEC files, the former site gasoline USTs were closed in place on June 3, 1992 by T.L. Roy with ANR-DEC approval. T.L. Roy indicated the former site USTs were filled with sand. According to ANR-DEC files, the former gasoline USTs were constructed of single-wall steel without cathodic protection.

C.A.B. Services, Inc. (CAB) of Manchester, New Hampshire were on site to observe excavation in the vicinity of the former site gasoline USTs. CAB reported VOC vapors were observed in the site UST excavations using a photoionization screening device (PID).

According to CAB, approximately 25-yards of petroleum contaminated soil were removed from the UST excavations. C.N. Brown indicated approximately 25-yards of petroleum contaminated soil from the site UST excavations were transported to the Merrimack Timber

Service (MTS), Inc. cold-mix asphalt processing facility located in Littleton, New Hampshire. MTS representatives indicated the former site soil has been processed into cold-mix asphalt and a processed soil certificate of destruction was forwarded to C.N. Brown.

According to ANR-DEC files, three new site gasoline USTs were installed in June 1992 by T.L. Roy. A summary of the ANR-DEC existing site UST information follows:

Number of Tanks	Туре	Capacity
3	gasoline	6,000
1	used oil	1,000

According to ANR-DEC files, the existing site gasoline USTs are constructed of double-walled steel, with external cathodic protection. According to ANR-DEC files the site used oil UST is constructed of unknown age and construction. Available ANR-DEC files did not indicate the presence of USTs on property immediately abutting the site.

ANR-DEC-HMD Files

The ANR-DEC-HMD spills data base listing indicated on December 21, 1978 gasoline odors were observed in the sewer system at the Portland Street School located approximately 1,300 feet east of the site. The ANR-DEC-HMD files indicated the St. Johnsbury Fire Department flushed the sewer system with water.

ANR-DEC-HMD spill files indicated approximately 20 gallons of diesel fuel was spilled on December 7, 1990 and approximately 4 gallons of diesel fuel was spilled on February 23, 1991 at the St. Johnsbury Trucking Company (St. J. Trucking) facility located at 76 Portland Street. The St. J. Trucking site is located approximately 700 feet east of the site. The available ANR-DEC-HMD spill files indicated the St. J. Trucking site diesel fuel releases were cleaned up by the St. Johnsbury Fire Department and Jet-Line Services, Inc.

The ANR-DEC-HMD spills data base listing indicated on September 19, 1991 an odor was observed in an excavation in the vicinity of USTs at the Portland Street Mini Mart (Mini Mart) site located at 81 Portland Street approximately 800 feet east of the site. The ANR-DEC files indicated the Mini Mart site observations were referred to the ANR-DEC UST program. The available ANR-DEC-IIMD spill files did not contain additional information pertaining to the Mini Mart site.

ANR-DEC-HMD files indicated Acetone and Methyl t-butyl ether (MTBE) were detected in ground water samples during a January 1990 site investigation at the Pratt-Reed - Old True Temper Mill site(Pratt-Reed). The Pratt-Reed site is located approximately 2,500 feet east of

the site adjacent to the intersection of Ely Street and Portland Street. Available ANR-DEC-HMD files indicated the potential source of the Pratt-Reed site ground water VOC contamination was not known. ANR-DEC-HMD files indicated Pratt-Reed site ground water monitoring is conducted on a quarterly basis by the Johnson Company, Inc. of Montpelier, Vermont and ground water VOC concentrations are generally decreasing over time.

ANR-DEC-SWMD Files

The ANR-DEC-SWMD files available to Aries did not contain information which would indicate the presence of oil, hazardous materials or improper solid waste disposal on the site or immediately abutting properties.

4.0 - SITE RECONNAISSANCE

On November 4, 1992, Aries' personnel visited the site to observe site surficial conditions and immediately abutting properties for visual evidence suggesting the presence of oil and hazardous materials. Approximate prominent site feature locations discussed are shown on Figure 2.

4.1 - Site Grounds

The site is located adjacent to the south side of Portland Street approximately 1,100 feet south of the confluence of the Moose River and Passumpsic River and approximately 750 feet east of the Passumpsic River, which flows to the south. The site ground surface is approximately 50 feet above the Passumpsic River mean water level elevation. The site slopes gradually downward to the north and is mostly paved.

The existing site gasoline USTs and associated pump island are located north of the site building. C.N. Brown representatives indicated the existing site USTs are equipped with overfill protection devices, cathodic protection, and are registered with the ANR-DEC.

The site used oil UST is located east of the site building and according to C.N. Brown is of unknown age and construction. Aries observed minor soil staining in the vicinity of the site used oil UST filler pipe.

The site building is serviced by the town water, sewer and storm water systems. According to C.N. Brown representatives, site sewage and building floor drains gravity feed into the town sanitary sewer and storm sewer systems located north of the site building parallel to Portland Street. The approximate location of the site water supply and sewer system piping is shown on Figure 2.

4.2 - Site Garage and Office Building Interior

Aries personnel inspected the site building interior for visual evidence suggesting the presence of oil and hazardous materials.

The site building was divided into four sections, consisting of an office, vehicle service bays, vehicle storage bays, and warehouse area. The building did not have a basement. The service garage was made up of two bays. The building floor drains were located in the approximate center of the service bay and vehicle storage bay areas. According to C.N. Brown representatives, the floor drains flow by gravity to the town storm sewer system. C.N. Brown representatives indicated that it is not known whether an oil/water separator or oil trap is connected to the building floor drains. Aries observed minor staining on the garage floor. Aries did not observe other evidence suggesting the presence of hazardous materials within the site building.

5.0 - TEST BORINGS AND MONITORING WELL INSTALLATIONS

Aries conducted subsurface explorations to assess site soil and ground water in the vicinity of the former site USTs for the presence of oil or hazardous materials. Five site test borings were drilled on November 4, 1992 by Great Works Test Borings, Inc. of Rollinsford, New Hampshire, and were logged by an Aries' engineer. The test borings were advanced using 4-1/4-inch L.D. hollow stem augers to a depth of approximately 16-feet below the ground surface. Standard penetration tests (SPTs) were performed at five-foot depth intervals using a 1 3/8-inch I.D. split-spoon sampler driven with a 140-pound hammer, to observe the relative in-situ soil density. Soil samples were visually classified in the field by an Aries engineer. The soil samples were screened on-site for the presence of VOC vapors using head space testing techniques with a Thermo Environmental Instruments, Inc. (TEI) Organic Vapor Meter (OVM) equipped with a photoionization detector (PID). The OVM has a lower detection limit of approximately 0.1 parts per million (ppm) for selected VOCs. The OVM was calibrated for benzene on site using an isobutylene standard provided by TEI.

The soil sample screening was conducted by placing a portion of the split-spoon sample into a precleaned glass jar. A double layer of aluminum foil was wrapped over the jar opening prior to placing the cap on the jar. The soil samples were then placed in the site building to bring the soil sample to approximate room temperature. The OVM probe was then used to puncture the aluminum foil seal and the maximum OVM reading was then recorded.

VOCs were detected in soils screened with the OVM from test borings MW-1, MW-2, MW-3 and MW-4 at concentrations ranging from 1 ppm to 479 ppm. VOCs were not detected in soil screened with the OVM from test boring MW-5. The soil samples were retained by Aries.

Monitoring well construction consisted of 2-inch diameter flush-joint threaded sections of Schedule 40 solid PVC riser pipe and 0.010-inch slotted PVC well screen. A ten-foot well screen was placed at the bottom of each test boring. The annulus between the borehole and the well screen was backfilled with clean silica sand. A bentonite seal was placed in the borehole annulus above the filter sand to reduce the potential for surface water infiltration. Steel curb boxes were set in concrete at the ground surface to protect the monitoring wells. Test boring logs, including soil descriptions, OVM readings, and monitoring well construction details, are provided in Appendix A.

6.0 - GROUND WATER SAMPLING AND ANALYSIS

As part of Aries' assessment, ground water samples were collected on November 18, 1992 and submitted to an outside laboratory for gasoline-related VOC analyses by EPA Method 602. A discussion of the sampling program follows.

6.1 - Ground Water Sampling

Before collecting the ground water samples from site monitoring wells, Aries measured the static ground water levels and checked for a free product layer. Aries purged the site monitoring wells of approximately three to five well volumes using dedicated disposable polyethylene bailers. Aries considers a well volume to be the volume of standing water in the well casing. Aries allowed the site monitoring wells to recharge before sampling. Aries collected ground water samples from site monitoring wells using the same bailers used to bail the wells.

Ground water samples were collected in general accordance with EPA sampling protocols and were submitted to Aquarian Analytical, Inc. (AAI) of Canterbury, New Hampshire for gasoline-related VOC analyses using EPA Method 602. Standard EPA chain-of-custody procedures were followed in submitting the samples. The chain-of-custody form and laboratory analytical results are presented in Appendix B.

6.2 - Laboratory Analytical Results

The laboratory results indicated gasoline-related Hazardous Substance List (HSL) VOCs including benzene, toluene, ethylbenzene and xylenes (BTEX) were detected in site ground water sample MW-1 at concentrations of 120 parts per billion (ppb), 1,580 ppb, 1,600 ppb, and 13,090 ppb, respectively. Ethylbenzene and Xylenes were detected in site ground water sample MW-2 at concentrations of 2.1 ppb and 15.2 ppb, respectively. BTEX and MTBE were detected in ground water sample MW-3 at concentrations of 408 ppb, 2,380 ppb, 330 ppb, 2,156 ppb and 2,110 ppb, respectively. BTEX and MTBE were detected in ground water sample MW-4 at concentrations of 165 ppb, 861 ppb, 938 ppb, 10,580 ppb and 92 ppb, respectively. Xylene was

detected in ground water sample MW-5 at a concentration of 5.8 ppb. The ground water analytical results are summarized in Table 2.

7.0 - DATA ANALYSIS

7.1 - Overburden Subsurface Conditions

Observed site soils consist of apparent glacial stream terrace deposits and lacustrine deposits. Glacial stream terrace deposits consist of sand and gravel with trace silt and were deposited by glacial streams. Lacustrine deposits consist of fine sand, silt and clay deposited within glacial lakes during periods where stagnant or ponded water was present.

Subsurface materials observed from the site test boring split spoon samples consisted of approximately 3 feet of brownish black sandy fill underlain by approximately 5 feet of dark brown poorly graded silty fine sand and sandy silt. The soil test borings were advanced approximately 16-feet below the ground surface. The silt content of observed soils ranged from approximately 0 to 60 percent. Observed soil densities generally ranged from loose to medium dense.

Aries checked the monitoring wells for a free product layer and measured ground water level using an electronic oil interface probe. Free product was not detected in the site monitoring wells using the oil interface probe. Ground water was observed in monitoring wells MW-1, MW-2, MW-3, MW-4 and MW-5 at depths ranging from approximately 8.94 feet to 11.63 feet below the ground surface approximately 15 minutes to 5 hours after monitoring well installation.

7.2 - Estimated Ground Water Flow Directions

Aries surveyed the top of PVC elevations in site monitoring wells referenced to the top of monitoring well MW-1 PVC which was designated an arbitrary elevation of 100 feet. Ground water elevation contours shown on Figure 3 were interpreted from the ground water levels referenced from the top of PVC in the five site monitoring wells. The direction of ground water flow, which is from higher to lower hydraulic head (higher to lower ground water elevation), is generally in a northeasterly direction across the site. Shallow site overburden ground water likely discharges to the Moose River located approximately 1,500 feet north of the site. Site ground water elevations are summarized in Table 1. Local ground water anomalies may exist at the site and nearby properties due to the influences of geologic conditions, subsurface structures, paved areas and underground utilities. Long term ground water flow directions.

7.3 - Overburden Hydraulic Gradient

Hydraulic gradient is the rate of change in total hydraulic head (elevation) per unit of distance of horizontal or vertical ground water flow. Based on site ground water levels measured by Aries on November 18, 1992, the average hydraulic gradient of the site shallow overburden ground water is approximately 0.067 feet per foot (ft/ft).

7.4 - Effective Porosity

The effective porosity of a soil is the ratio of the volume of interconnected pore space available for fluid flow to the total volume. Typical effective porosities for the site surficial deposits are expected to range from 10% to 20% for the silty sand and sandy silt (Driscoll, 1981).

7.5 - Overburden Hydraulic Conductivities

Hydraulic conductivity is the relationship of the quantity of water that flows through a unit cross-section area of a porous medium per unit time under a hydraulic gradient of 100 percent at a specified temperature of 15.6 degrees celsius. On November 18, 1992 Aries' personnel conducted rising head permeability tests in monitoring wells MW-3 and MW-4. The permeability test data were analyzed using the Hvorslev Method (1951). Hvorslev analysis results indicate estimated shallow overburden hydraulic conductivities ranged from approximately 0.06 ft/day for silty sand observed in monitoring well MW-3 to 0.10 ft/day for the silty sand observed in monitoring well MW-4. Results of Hvorslev method analysis of permeability test data are generally considered to provide an order-of-magnitude accuracy. The estimated hydraulic conductivity values of site soils from permeability testing are consistent with values reported in literature for similar soils (Freeze and Cherry, 1979). Aries' permeability test plots and results are provided in Appendix C.

7.6 - Estimated Ground Water Flow Velocity

The average linear ground water flow velocity of site shallow ground water was estimated by Aries using Darcy's Law which is expressed by the following equation:

$$V = Ki$$
 n

where:

V = Average linear ground water flow velocity, ft/day.

K = Hydraulic conductivity, ft/day.

n = Effective porosity, percent.

i = Hydraulic gradient, ft/ft.

Aries estimated the average site ground water velocity for the shallow site overburden as follows:

 $V = \frac{(0.06 \text{ to } 0.10 \text{ ft/day})*(0.067)}{0.2}$ V = 0.02 ft/day to 0.03 ft/day V = 7 ft/year to 11 ft/year

Aries estimated the volumetric rate of shallow ground water flow from the site area to off site areas using Darcy's equation:

Q = Kbiw

where: Q = Volumetric flow rate through the geologic cross-section, ft³/day.

K = Hydraulic conductivity, ft/day.

b = Saturated thickness of overburden, ft.

i = Hydraulic gradient, feet per foot (ft/ft).

w = Width of the site, feet.

Using an average site saturated thickness for the site deposits of approximately 30 feet, a hydraulic gradient of 0.067 ft/ft, a site width of approximately 77 feet, and a maximum estimated hydraulic conductivity of 0.03 ft/day, the approximate ground water flow rate discharging from the site is 4.6 ft³/day or approximately 0.2 gallons per minute (gpm).

7.7 - Site Ground Water VOC Distribution

Figure 4 depicts observed site ground water monitoring well BTEX and MTBE concentration distribution. The highest ground water total BTEX concentrations were observed in monitoring wells MW-1, MW-3 and MW-4, which are located down-gradient of the former site USTs and the site pump island. Observed site total BTEX and MTBE VOC concentrations are consistent with a gasoline release in the former site UST and pump island area with the migration of VOC-contaminated ground water to the northeast.

Enforceable drinking water standards, referred to as Maximum Contaminant Levels (MCLs), have been developed for public water supply systems by the United States Environmental Protection Agency (EPA) under the Safe Drinking Water Act. MCLs are based on an analysis of health effects data, existing drinking water treatment technology, risk analysis and economic factors. The estimation of adverse health effects is generally based on an assumed lifetime exposure to the contaminant for a 70 kg (154 pound) adult who consumes 2 liters of

water per day. The EPA generally estimates the amount of the substance to which the average person is likely to be exposed from all sources (air, food, water, etc.) and then determines the fraction of the total intake of a contaminant from drinking water supplies.

Vermont Chapter 12 Ground Water Protection Rules, Subchapter 7, Part 2, Primary Ground Water Quality Standards require in part that ground water contaminant concentrations be less than MCLs. The MCLs for BTEX have been set at 5 ppb, 1,000 ppb, 700 ppb, and 10,000 ppb, respectively.

An MCL has not been set for MTBE, however the EPA has used 200 ppb as an environmental health risk assessment unit action level. MTBE is used as a gasoline additive.

VOCs were observed exceeding MCLs in ground water samples from monitoring wells MW-1, MW-3 and MW-4 located adjacent to the site property boundaries.

7.8 - Potential Contaminant Migration Paths

Based on information provided by C.N. Brown and St. Johnsbury town officials, site utilities appear to be located above the water table and therefore are not likely to substantially influence contaminated ground water flow. However, gasoline-related VOCs may preferentially migrate through the site utility vadose zone. Further, gasoline-related VOCs migrating through the vadose zone may result in ground water contamination of other site areas where infiltration from above carries dissolved VOCs to the water table.

Based on Aries' site soil and ground water VOC contaminant data and ground water elevation data, site gasoline contamination is moving through the subsurface as dissolved constituents in the ground water. VOC contamination dissolved in ground water generally migrates with ground water flow but at a slightly slower rate because of soil adsorption and desorption processes. Therefore, site dissolved VOC contamination will likely migrate in a north and northeast direction from the former site USTs and pump island vicinity. Although, ground water flow directions down gradient from the C.N. Brown property have not been measured directly, site data and the U.S.G.S topographic map indicate ground water likely flows toward the Moose River, which is located approximately 1,500 feet north of the site.

8.0 - ASSESSMENT SUMMARY AND RECOMMENDATIONS

8.1 - Assessment Summary

Aries developed the following summary based on the work conducted as part of this assessment.

General Site Operations

According to available site background information, the site has been used as a gasoline station and vehicle maintenance facility since the 1920's.

Available ANR-DEC files indicate that the former site USTs were filled with sand and closed in place by T.L. Roy on June 3, 1992 with ANR-DEC approval.

Approximately 25 yards of petroleum contaminated soil was removed from the vicinity of the former site USTs and fuel pump island for off-site disposal at the MTS asphalt cold-mix facility in Littleton, New Hampshire. Available ANR-DEC files and St. Johnsbury town files did not indicate the presence of oil, hazardous materials or USTs on properties immediately abutting the site.

Site Hydrogeology

Subsurface materials observed from the site test boring split spoon samples consisted of approximately 3 feet of brownish black sandy fill underlain by approximately 5 feet of loose to medium dense dark brown poorly graded silty fine sand and sandy silt. Ground water was observed at depths ranging from approximately 8 feet to 11 feet below the ground surface.

The general direction of shallow site overburden ground water flow is generally to the northeast. Aries estimates that the average linear shallow ground water flow velocity ranges from approximately 7 ft/year to 11 ft/year.

Site Soil Contamination

VOCs were detected in soils screened with the OVM from test borings MW-1, MW-2, MW-3 and MW-4 at concentrations ranging from 1 ppm to 479 ppm. VOCs were not detected in soil screened with the OVM from test boring MW-5.

Ground Water Contamination

Based on work conducted as part of this assessment, site data indicate that VOCs were observed exceeding MCLs in ground water samples from monitoring wells MW-1, MW-3 and MW-4 located adjacent to the site property boundaries. Free petroleum product was not observed in the site monitoring wells installed by Aries.

The present threat to drinking water supplies from gasoline-related contaminants in the site ground water appears to be low, since the businesses and residences in the site vicinity are serviced by public water supply.

8.2 - Recommendations

Aries recommends the following based on the data collected as part of this assessment:

- Ground water monitoring should be conducted to assess ground water BTEX and MTBE concentration trends.
- Soil excavation and disposal or the installation of an in-situ site soil bioventing system should be considered to reduce residual site soil VOC concentrations in the vicinity of monitoring wells MW-1, MW-3 and MW-4;
- VOC vapor screening and a soil gas survey using an OVM photoionization device should be conducted down-gradient of the site to further assess the potential off-site migration of ground water BTEX contamination;
- The site 1,000-gallon used oil UST should be assessed for compliance with ANR-DEC Chapter 8 UST tightness testing and leak detection regulations; and
- The assessment report should be forwarded to ANR-DEC-SMS officials for review in accordance with the July 16, 1992 ANR-DEC site investigation request.

9.0 - REPORT LIMITATIONS

Aries used information provided by others to prepare this report. Aries did not independently check the accuracy or completeness of the information others provided. The report was completed based on a limited number of explorations and subsequent interpretations. Aries anticipates variations in actual site conditions beyond those interpreted, and would have to reevaluate the report conclusions and recommendations if additional site data is made available. Aries anticipates site conditions will change with seasonal variations. The analytical data presented was limited to the contaminants tested for. Additional contaminants not tested for could be present in site soil and ground water. Aries' report was prepared on behalf of and for exclusive use of the C.N. Brown Company as a preliminary soil and ground water assessment of the 51 Portland Street site in St. Johnsbury, Vermont. Aries provides no expressed or implied warranty.

Table 1 November 1992 Ground Water Level Data (in feet)

C.N. Brown Company - 51 Portland Street St. Johnsbury, Vermont

Well Number	Ground Water Depth	Ground Water Elevation	Measuring Point Reference	Reference Elevation
MW-1	10.98	89.02	PVC	100.00
MW-2	8.26	90.91	PVC	99.17
MW-3	9.65	89.80	PVC	99.45
MW-4	10.69	89.07	PVC	99.76
MW-5	7.83	92.31	PVC	100.14

Notes:

- 1. The monitoring well elevation survey was referenced to an arbitrary datum.
- 2. The ground water level obsevations were conducted by
- Aries on November 18, 1992.

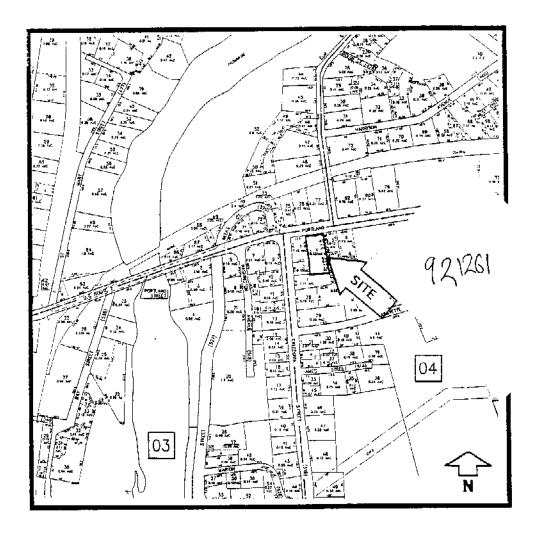
 3. Free product was not detected in the site monitoring wells by Aries on November 18, 1992 using an electronic interface probe.

Ground Water Gasoline-Related Volatile Organic Compound Concentrations C.M. Brown Company - 51 Portland Street Site St. Johnsbury, Vermont Table 2

-	Ground			Monitoria Sample Date	Monitoring Well Sample Sample Date · Month/Day/Year	ole //Year	
Volatile Organic Compound Criteria	Quality Criteria	MW-1 11/18/92	MW-2 11/18/92	MW-3	11 / 19 / 42	WW-5 Trip Blank	Trip Blank
HSL VOCs					20 (22 (22	76/31/11	76/91/11
Benzene	*	120		408	155		
Toluene	1,000*	1,580		2,380	851		
Bthylbenzene	*D07	1,600	2.1	330	1 8 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6		
Xylene	10,000*	13,090	15.2	2,156	10,560	η. 88.	
Non-HSL VOCs		•					
Methyl t-butyl ether	200**	: <u>-</u>		2,116	92		

NOTES:

All units are in micrograms per liter (ug/L).
 A blank space indicates that the parameter was not detected.
 Primary drinking water standard Maximum Contaminant Level (MCL).
 USBEA Environmental Health Risk Assistment Unit action level.



LOCUS MAP

PREPARED FROM: TOWN OF ST. JOHNSBURY, VERMONT TAX MAP 24

APPROXIMATE SCALE: 1" = 500'

JOB # 92070



ENVIRONMENTAL SITE ASSESSMENT

C.N. BROWN

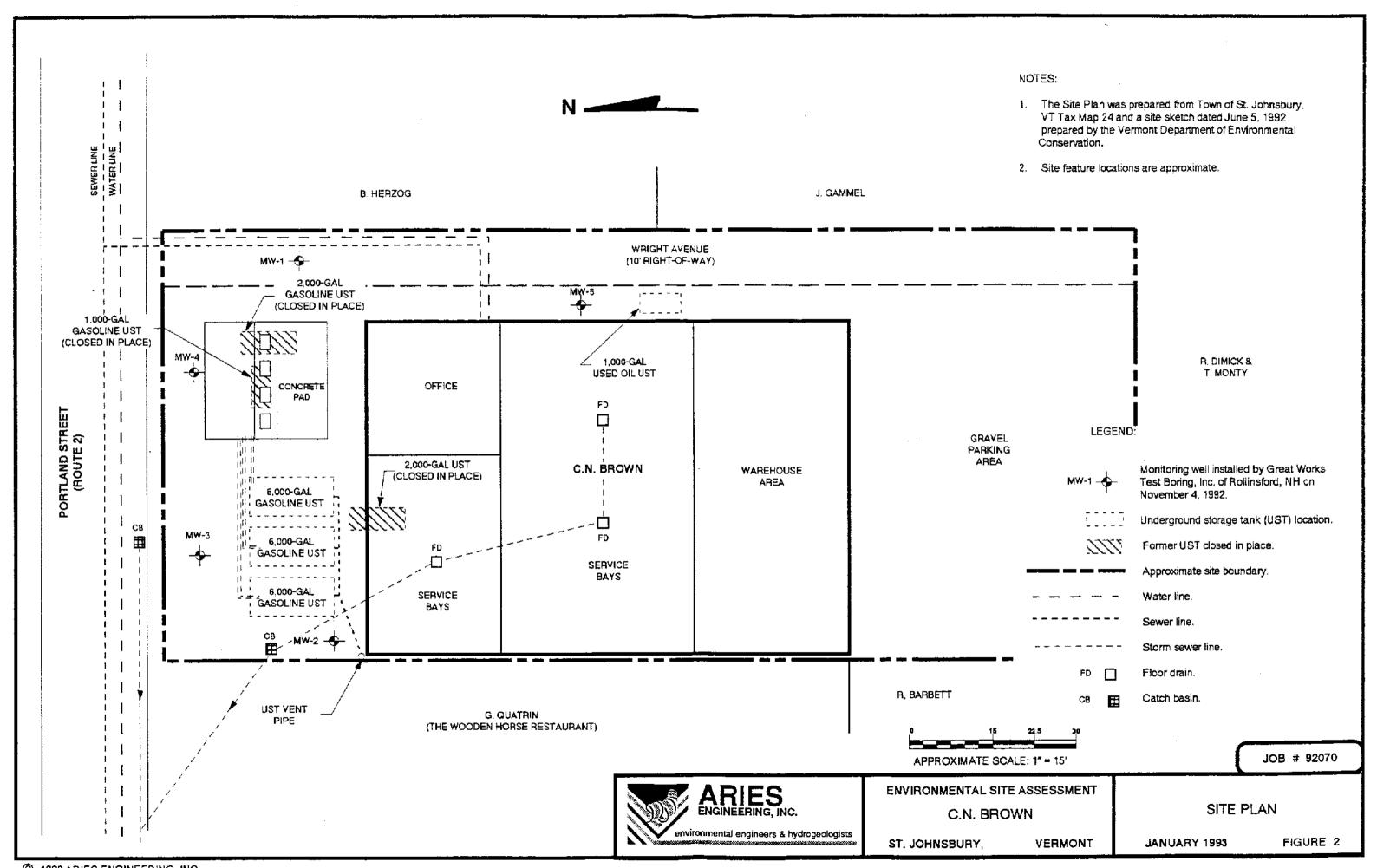
ST. JOHNSBURY,

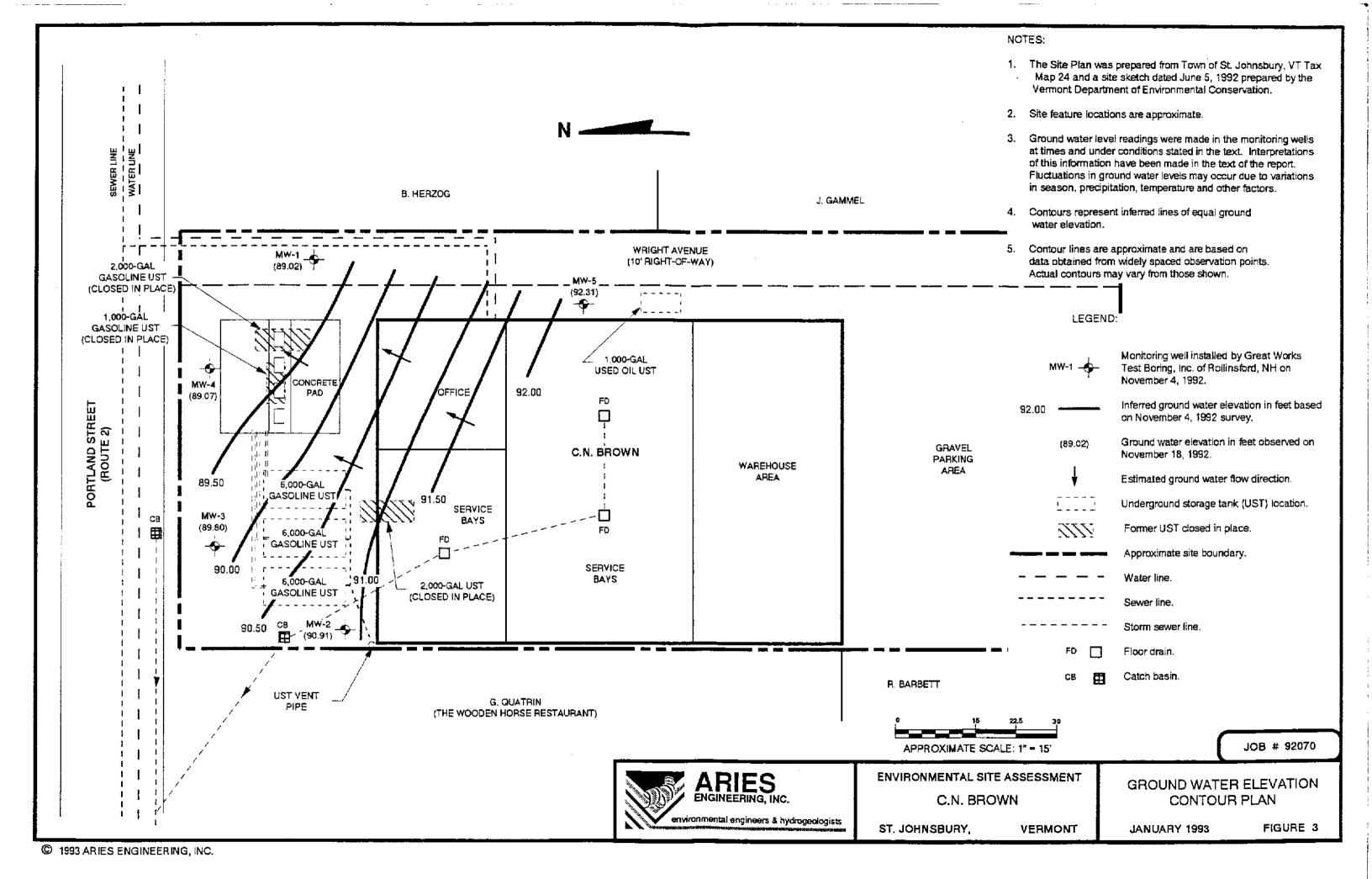
VERMONT

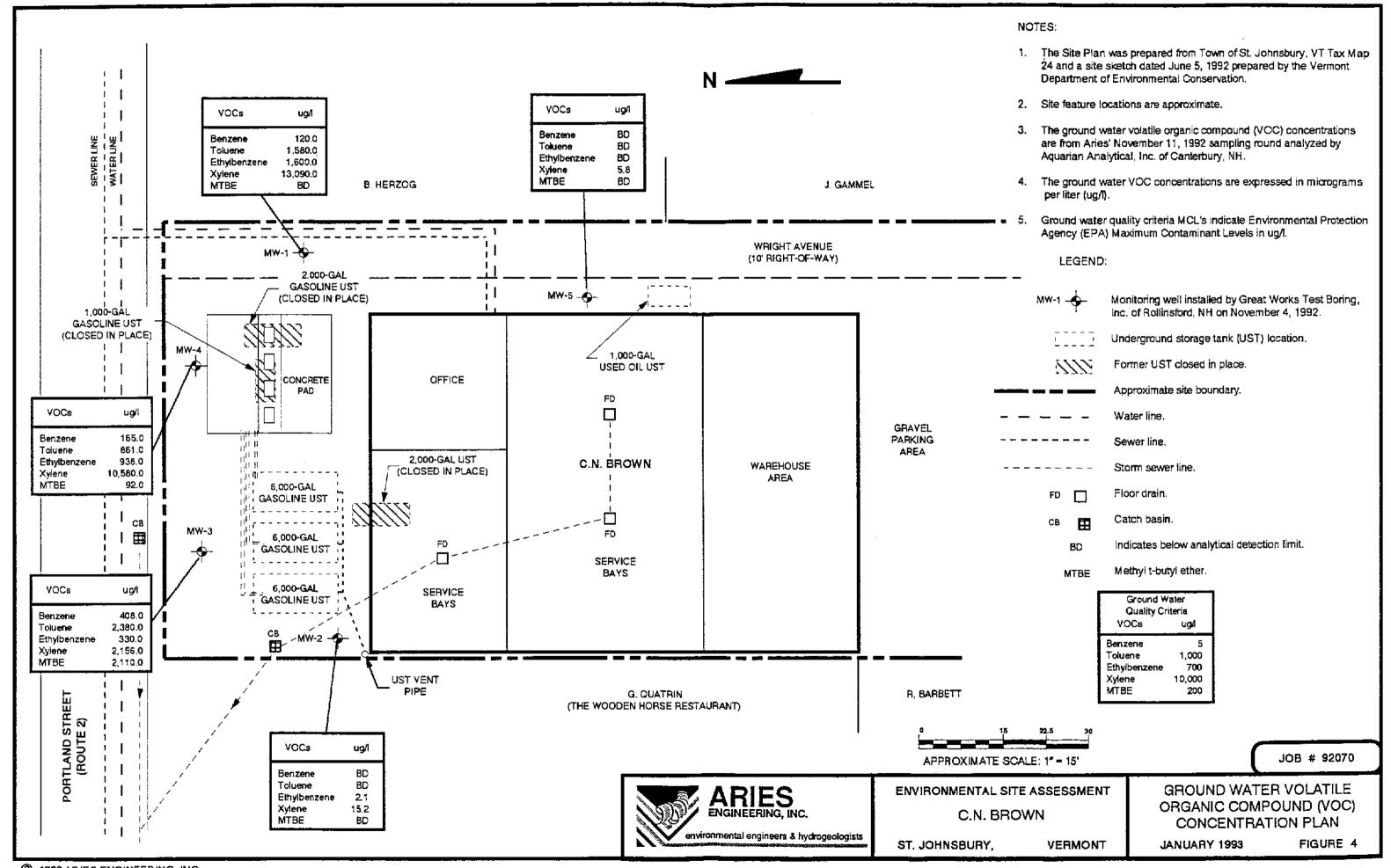
LOCUS PLAN

JANUARY 1993

FIGURE 1







ARIES ENGINEERING, INC. OTHERSTORM A THE THE PRESENCE IN THE	PROJECT :	C.N. Brown Company	BORING NO.	:	MW-1 1 of 1 92070		
Contentional deprison a hydrogeningth	LOCATION:	15 Portland St., St. Johnsbury, VT	SHEET	:	1	of	1
ORING CO.: Great Works Test Bor	ing Co.	GROUND WATER READINGS	FILE NO.	:		92070	 }

REMAN : T. Morrow DATE TIME DEPTH CASING STAB. T. CASING SAMPLER ARIES REP.: J. Vercellotti 11/4 3:00 11.63 screen in 5 hrs TYPE HSA 24^H Split Spoon ΤE : 11/04/92 11/18 1:00 10.98 screen in 14 days SIZE I.D. : 4-1/4-inch 1-3/8- inch PVC EL. : 100.00 HAMMER WT. : 140 lbs.

		!			INSTRU		 		1
PTH	SAMP NO.	6-INCHES	SAMPLE INTERVAL	ADV./ RECOV	READ -PPM	SAMPLE DESCRIPTION	STRATA. CHANGE		NOTES
	<u> </u>		FEET	INCHES				- Curb box Cove	er e
-	5-1	Grab Sample	0-2		172	Asphalt Pavement Silty Sand FILL, poorly graded c-m Sand, so. Silt, moist, b(k-bn, SP. (FILL)	ASPHALT 0.2'- Silty SAND (Fill)	 	
5—	\$-2	7-9-13-10	4.5-6.5	24/12	269	Silty Sand, poorly graded f. Sand, so. Silt, m. dense, moist, dk-bn, SP.	Silty SAND	Seal	eat
_ _ _							6' Sand	2" dia Sched 40 PVC	
10	S-3	9-3-3-3	9.5-11.5		118	Silty Sand, poorly graded f. Sand, so. Silt, loose, wet, dk-bn, SP.		0.010" Slott Well Screen	ed
- 	S-4	1-1-50/1	14.5-15.6		220	Silty Sand, poorly graded f. Sand,			
15				-		so. Silt, loose, wet, dk-bn, SP.	·	15.01	1, 2
-		:			ļ	Bottom of boring at approximately 16 feet.			
-							•		

I,

ĸ

^{1.} Great Works advanced the test boring to a depth of approximately 16 feet below the ground surface. Great Works conducted soil sampling to a depth of approximately 15.6 feet below the ground surface.

^{2.} Great Works constructed the monitoring well of 2" dia. Sched. 40 solid PVC riser and 10 feet of .010"-slot well screen set at a depth of approximately 15.0 feet. Great Works set a protective curb box in concrete at the ground surface.

^{3.} Aries referenced the PVC riser pipe elevations in site monitoring wells to monitoring well MW-1. Aries assumed the PVC riser pipe elevation in monitoring well MW-1 at elevation 100.00 feet.

^{4.} Aries referenced the ground water depth measurements to the top of the PVC riser pipe.

- SOIL BORING LOG -

11	EHO	RIES		PROJEC	_	C.N. Brown	· · · · · ·	 .	·	BORING NO.	:	MU-2	
77/2		.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		LOCATI	ON:	15 Portlan	d St., St.J	ohnsbury, V	т	SHEET	: 1	of 1	
OR I N			ks Test Bor	ing Co.		GROUN	D WATER REA	DINGS	,_,	FILE NO.	:	92070	
)REM	AN :	T. Morrow			DATE	TIME	DEPTH	CASING	STAB. T.		CASI	ING SAMPLE	R
RIES	REP.:	J. Vercel	lotti		11/4	3:15	9.03	screen in	3 hrs	TYPE	: HSA	24" Spli	t Spe
ıΤΕ	:	11/04/92			11/18	1:20	8.26	screen in	14 days	SIZE I.D.	: 4-1/4-ir	nch 1-3/8-ii	nch
/C E!	. :	99.17			·				<u> </u>	HAMMER WT.	: -	140 lbs	
PTH	SAMP NO.	BLOWS PER 6-INCHES	SAMPLE INTERVAL	ADV./ RECOV	INSTRU READ -PPM		SAMPLE DESC	RIPTION		STRATA. CHANGE	EQUIPMENT	INSTALLED	NOI
			FEET	INCHES	·							Curb box Cover	+-
	S-1	Grab	0-2		ND	Asphalt Pu Silty Sand so. Silt,	d FILL, poor	rly graded : -bn, SP. (F	с-л Sand, ILL)	ASPHALT		- Cement -1.0' - Backfill -2.0' - Bentonite Seat -3.0' - Filter Sand	
5-	5-2	5-12-13-9	4.5-6.5		54	Silty Sand Gravel, so	d, poorly gr	aded f. Sar dense, mois	nd, tr. f.	Silty SAND		4.01	
0	S-3	1-2-1-2	9.5-11.5			poorly gra gr-bn, ML.	ded f. Sanc	city Silt, I, soft, wet	•	Sandy Silt		2" dia Sched 40 PVC 0.010" Slotted Well Screen	1
-	\$-4	12-7-8- 50/5	14.5-16.4		1	Sandy Silt poorly gra gr-bn, ML.	ded f. Sand	city Silt, , soft, wet	,	-16.41		14.0'	1,
-						Battom of (Split-spo	boring at a on refusal	pproximatel at approxim	y 16.4 fee ately 16.4	et. · feet}			

ng to a depth of approximately 16.4 feet below the ground surface.

^{2.} Great Works constructed the monitoring well of 2" dia. Sched. 40 solid PVC riser and 10 feet of .010"-slot well screen set at a depth of approximately 14.0 feet. Great Works set a protective curb box in concrete at the ground surface. 3. Aries referenced the PVC riser pipe elevations in site monitoring wells to monitoring well MW-1. Aries assumed the PVC riser pipe elevation in monitoring well MW-1 at elevation 100.00 feet.

4. Aries referenced the ground water depth measurements to the top of the PVC riser pipe.

SOIL BORING LOG —— PROJECT : C.N. Brown Company LOCATION: 15 Portland St., St. Johnsbury, VT

DREMAN

ITE

ĸ

BORING NO. : MW-3

SHEET ٥f 1

INORING CO.: Great Works Test Boring Co. GROUND WATER READINGS FILE NO. 92070 : T. Morrow DATE TIME DEPTH CASING STAB. T. CASING SAMPLER ARIES REP.: J. Vercellotti 11/4 3:30 10.38 screen in 2 hrs TYPE 24" Split Spoon HSA : 11/04/92 11/18 1:30 9.65 screen in 14 days SIZE I.D. : 4-1/4-inch 1-3/8-inch

PVC EL. 99,45 HAMMER WT. : 140 lbs.

PTH	SAMP NO.	BLOWS PER 6-INCHES	SAMPLE INTERVAL	ADV./ RECOV	INSTRU READ -PPM	SAMPLE DESCRIPTION	STRATA. CHANGE	E	QUIPMEN	T INSTALLED	NOTES
	ļ		FEET	INCHES						Curb box Cover	
_	\$-1	Grab	0-2		180	Asphalt Pavement Silty Sand FILL, poorly graded c-m Sand, so. Silt, moist, blk-bn, SP. (FILL)	ASPHALT0.2'- Silty SAND (Fill)			Cement 1.0' Backfill 2.0'	
- 5—	\$-2	20-6-12-	4.5-6.5		479	Silty Sand, poorly graded f. Sand, so. Silt, m. dense, moist, dk-bn, SP.	Silty SAND	 		Bentonite Seal Seal 4.0' Filter Sand 5.0'	
10	\$-3	3-2-2-2	9.5-11.5		84	Sandy Silt, l. plasticity Silt wi. f. Sand, soft, wet, gr-bn, ML.	8' Sandy SILT			2" dia Sched 40 PVC 0.010" Slotted Well Screen	
- - 15—	S-4	1-1-1-1	14.5-16.5			Sandy Silt, l. plasticity Silt wi. f. Sand, soft, wet, gr-bn, ML. Bottom of boring at approximately 16.5 fee	et.			-15.0'	1, 2
-											Ì

^{1.} Great Works advanced the test boring to a depth of approximately 16.5 feet below the ground surface. Great Works conducted soil sampling to a depth of approximately 16.5 feet below the ground surface.

^{2.} Great Works constructed the monitoring well of 2" dia. Sched. 40 solid PVC riser and 10 feet of .010"-slot well screen set at a depth of approximately 15.0 feet. Great Works set a protective curb box in concrete at the ground surface.

^{3.} Aries referenced the PVC riser pipe elevations in site monitoring wells to monitoring well MW-1. Aries assumed the PVC riser pipe elevation in monitoring well MW-1 at elevation 100.00 feet.

^{4.} Aries referenced the ground water depth measurements to the top of the PVC riser pipe.

 SOIL BORING LOG — PROJECT : C.N. Brown Company BORING NO. : MU-4 LOCATION: 15 Portland St., St. Johnsbury, VT SHEET of BORING CO.: Great Works Test Boring Co. GROUND WATER READINGS FILE NO. 92070 **DREMAN** : T. Morrow DATE TIME DEPTH CASING STAB. T. CASING SAMPLER ARIES REP.: J. Vercellotti 11/4 3:35 11.45 nim 0E screen in TYPE **HSA** 24" Split Spoon : 11/04/92 11/18 1:40 10.69 screen in 14 days SIZE I.D. : 4-1/4-inch 1-3/8-inch PVC EL. 99.76 HAMMER WT. : 140 lbs. INSTRU EPTH SAMP BLOWS PER SAMPLE ADV./ READ STRATA. FEET NO. 6-INCHES INTERVAL RECOV -PPM SAMPLE DESCRIPTION CHANGE EQUIPMENT INSTALLED NOTES FEET INCHES - Curb box Cover Asphalt Pavement ASPHALT | Cement Silty Sand Fill, poorly graded c-m Sand, so. Silt, moist, blk-bn, SP. (Fill) 5-1 Grab 0-2 170 -0.21 1.0 Silty Backfill SAND 2.01 (Fill) - 31-Bentonite Seal Seal S-2 2-3-6-36 4.5-6.5 339 Silty Sand, poorly graded f. Sand, Silty 4.0 so. Silt, m. dense, moist, dk-bn, SP. Filter Sand SAND ا0.5∔ 2" dia . a -Sched 40 PVC 0.010" Slotted Well Screen s-3 4-4-3-5 9.5-11.5 331 Sandy Silt, L. plasticity Silt wi. 10f. Sand, soft, wet, gr-bn, ML. Sandy SILI 4-3-4-1 14.5-16.5 11 Sandy Silt, L. plasticity Silt wi. f. Sand, soft, wet, gr-bn, ML. 1, 2 15-15.0 Bottom of boring at approximately 16.5 feet. `O-

^{1.} Great Works advanced the test boring to a depth of approximately 16.5 feet below the ground surface. Great Works conducted soil sampling to a depth of approximately 16.5 feet below the ground surface.

Great Works constructed the monitoring well of 2" dia. Sched. 40 solid PVC riser and 10 feet of .010"-slot well screen set at a depth of approximately 15.0 feet. Great Works set a protective curb box in concrete at the ground surface.
 Aries referenced the PVC riser pipe elevations in site monitoring wells to monitoring well MW-1. Aries assumed the PVC riser pipe elevation in monitoring well MW-1 at elevation 100.00 feet.

^{4.} Aries referenced the ground water depth measurements to the top of the PVC riser pipe.

			1		· · · · · · · · · · · · · · · · · · ·	- SOIL BORII	NG LOG						
	ARIES HOMEERHIS, HIC.		PROJEC	T:	C.N. Brown	n Company			BORING NO.	. :	Mi	W-5	
	nomental engineers & hydro	Address to	LOCATI	ON:	15 Portla	nd St., St.,	Johnsbury, V	rt	SHEET	: 1	O1	f 1	
BORING CO	.: Great Wo	rks Test Bor	ing Co.		GROU	ND WATER REA	ADINGS	·····.	FILE NO.	:	97	2070	_
OREMAN	: T. Morro	W		DATE	TIME	DEPTH	CASING	STAB. T.		CA	SING	SAMPLER	
ARJES REP	.: J. Verce	llotti		11/4	3:45	8.94	screen in	15 min	TYPE	- HS		24" Split	
ATE	: 11/04/92			11/18	1:45	7.83	screen in	14 days	SIZE [.D.			1-3/8-in	
PVC EL.	: 100.14	. <u>.</u> .		<u> </u>		 	 	 	HAMMER WT.			140 lbs.	
EPTH SAM	.		ADV./ RECOV	INSTRU READ -PPM		SAMPLE DESC	CRIPTION	<u> </u>	STRATA. CHANGE		NT INSTA		NOTES
		FEET	INCHES						 		– Curb t	xx Cover	-
- s-	1 Grab	0-2 4.5-6.5		ND ND	so. Silt,	nd fill, poo , moist, blk nd, poorly g	orly graded of the control of the co	ILL)	ASPHALT O.2' Silty SAND (Fill) Silty SAND		Cemen 7.0' Backf -2.0' Bento Se	nt	
s-3	6-6-4-4	9.5-11.5		ND	Sandy Sil f. Sand,	t, i. plast firm, wet, i	icity Silt w gr-bn, ML.	łi.	Sandy SILT		0.010	a 40 PVC " Slotted Screen	
- S-4 15-	7-8-14-12	14.5-16.5		ND	t. Sand,	stiff, wet,	icity Silt w gr-bn, ML. approximatel		et.		15.0		1, 2
- - - - - -													

2. Great Works constructed the monitoring well of 2" dia. Sched. 40 solid PVC riser and 10 feet of .010"-slot well screen

4. Aries referenced the ground water depth measurements to the top of the PVC riser pipe.

Great Works advanced the test boring to a depth of approximately 16.5 feet below the ground surface. Great Works conducted soil sampling to a depth of approximately 16.5 feet below the ground surface.

set at a depth of approximately 15.0 feet. Great Works set a protective curb box in concrete at the ground surface.

3. Aries referenced the PVC riser pipe elevations in site monitoring wells to monitoring well MW-1. Aries assumed the PVC riser pipe elevation in monitoring well MW-1 at elevation 100.00 feet.

APPENDIX B LABORATORY ANALYTICAL RESULTS

久

AQUARIAN ANALYTICAL INC.

Laboratory Services P.O. Box 186

Canterbury, N.H. 03224 603-783-9097

11-24-92,09:22

Mr. Joe Vercellotti Aries Engineering Inc. 46 South Main Street Concord, N.H. 03301

Dear Mr. Joe Vercellotti:

Please find enclosed the reports, and invoice for the samples that were logged in on, 11-19-92.

AAI Sample	Date Sampled	Project Description	Sample Location
6949 6950 6951 6952 6953 6954	11-18-92 11-18-92 11-18-92 11-18-92 11-18-92	92070 CN BROWN 92070 CN BROWN 92070 CN BROWN 92070 CN BROWN 92070 CN BROWN 92070 CN BROWN	MW-1 MW-2 MW-3 MW-4 MW-5 TRIP BLANK

To perform these analyses, the following methods were used:

QTY. EPA Methodologies/Applications

6 BTEX/MTBE Water

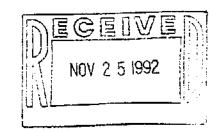
Thank you for using Aquarian Analytical Inc. on this project. If I can be of any further help, please feel free to call.

Sincerely,

William M. Rice

Laboratory Director

doc. L00364





Laboratory Services

P.O. Box 186

Canterbury, N.H. 03224

603-783-9097

BTEX only Report 11-24-92,09:19 Sample 6949

Project = 92070 CN BROWN

Date Sampled = 11-18-92

Date Logged In = 11-19-92,08:37

Date of Analysis = 11-23-92

Person Sampling = J. VERCELLOTTI

Location = MW-1

Organic Compound	Result	Det. Lim.	MCL
Benzene	120.0	100.0	5
Toluene	1580.0	100.0	1000
Ethylbenzene	1600.0	100.0	700
m&p-Xylene	10300.0	100.0	- 10000
o-Xylene	2790.0	100.0	- Tot.(o+m+p)
Methyl t-butyl ether	BD	100.0	, , , , , , , , , , , , , , , , , , , ,

<u>lomments:</u>

Sample Matrix = Water

Method of Analyses = EPA-624, (capillary)



Laboratory Services
P.O. Box 186
Cunterbury, N.H. 03224
603-783-9097

BTEX only Report 11-24-92,09:19 Sample 6950

Project = 92070 CN BROWN

Date Sampled = 11-18-92

Date Logged In = 11-19-92,08:39

Date of Analysis = 11-23-92

Person Sampling = J. VERCELLOTTI

Location = MW-2

Organic Compound	Result	Det. Lim.	MCL
Benzene	BD	2.0	5
Toluene	BD	2.0	1000
Ethylbenzene	2.1	2.0	700
m&p-Xylene	11.3	2.0	- 10000
o-Xylene	3.9	2.0	- Tot.(o+m+p
Methyl t-butyl ether	BD	2.0	, , , , , , , , , , , , , , , , , , ,

Comments:

Sample Matrix = Water

Method of Analyses = EPA-624, (capillary)



Laboratory Services
P.O. Box 186
Canterbury, N.H. 03224

603-783-9097

BTEX only Report 11-24-92,09:19 Sample 6951

Project = 92070 CN BROWN

Date Sampled = 11-18-92

Date Logged In = 11-19-92,08:39

Date of Analysis = 11-22-92

Person Sampling = J. VERCELLOTTI

Location = MW-3

Organic Compound	Result	Det. Lim.	MCL
Benzene	408.0	10.0	5
Toluene	2380.0	10.0	1000
Ethylbenzene	330.0	10.0	700
m&p-Xylene	1420.0	10.0	- _10000
o-Xylene	736.0	10.0	- Tot.(o+m+p
Methyl t-butyl ether	2110.0	10.0	1200,000

Comments:

Sample Matrix = Water

Method of Analyses = EPA-624, (capillary)



Laboratory Services

P.O. Box 186

Canterbury, N.H. 03224

603-783-9097

BTEX only Report 11-24-92,09:20 Sample 6952

Project

= 92070 CN BROWN

Date Sampled

= 11-18-92

Date Logged In

= 11-19-92,08:40

Date of Analysis

= 11-22-92

Person Sampling

= J. VERCELLOTTI

Location

= MW-4

Organic Compound	Result	Det. Lim.	MCL
Benzene	165.0	20.0	5
Toluene	861.0	20.0	1000
Ethylbenzene	938.0	20.0	700
m&p-Xylene	7910.0	20.0	- _10000
o-Xylene	2670.0	20.0	- Tot. {o+m+p
Methyl t-butyl ether	92.0	20.0	, , ,

<u> Jomments:</u>

Sample Matrix = Water

Method of Analyses = EPA-624, (capillary)



Laboratory Services
P.O. Box 186

Canterbury, N.H. 03224

603-783-9097

BTEX only Report 11-24-92,09:20 Sample 6953

Project = 92070 CN BROWN

Date Sampled = 11-18-92

Date Logged In = 11-19-92,08:40

Date of Analysis = 11-22-92

Person Sampling = J. VERCELLOTTI

Location = MW-5

Organic Compound	Result	Det. Lim.	MCI,		
Benzene	BD	2.0	5		
Toluene	BD	2.0	1000		
Ethylbenzene	BD	2.0	700		
m&p-Xylene	5.8	2.0	- _10000		
o-Xylene	BD	2.0	- Tot.(o+m+p)		
Methyl t-butyl ether	BD	2.0	, = = = = (- · · ·		

Comments:

Sample Matrix = Water

Method of Analyses = EPA-624, (capillary)



Laboratory Services
P.O. Box 186
Canterbury, N.H. 03224
603-783-9097

BTEX only Report 11-24-92,09:20 Sample 6954

Project

= 92070 CN BROWN

Date Sampled

= 11-18-92

Date Logged In

= 11-19-92,08:40

Date of Analysis

= 11-22-92

Person Sampling

= J. VERCELLOTTI

Location

= TRIP BLANK

Organic Compound	Result	Det. Lim.	MCL
Benzene	BD	2.0	5
Toluene	BD	2.0	1000
Ethylbenzene	BD	2.0	700
m&p-Xylene	BD	2.0	- _10000
o-Xylene	BD	2.0	- Tot. {o+m+p
Methyl t-butyl ether	BD	2.0	1 1 (O (m) p

<u>Comments:</u>

Sample Matrix = Water

Method of Analyses = EPA-624, (capillary)



AQUARIAN ANALYTICAL, INC. PO Box 186, Morrill Road

Canterbury, NH 03224

Laboratory Services

FAX:

(603) 783-9097 PHONE: (603) 783-9097



Project No	umber Project Name	BROWN				₹	own								,			
 _	070 CN T	2KOMU							<u> </u>			<u> </u>	' <u>.</u>					
Project E	ingineer J. Verce	Motti		Pho	5) end	603	22	<u>ا</u> لم	-75	5-45	Flei	ports i	& Invo	oice To:				
Company	ARIES				< ()										-		
	Description	on					AAI	W	ork			Sul	bcor	tracte	d W	ork		
AAI ID#	Sample Identification	Date / Time Collected	Sample Matrix	Number of Containers	524.2	624 / 8240 / 8260	BTEX /	MTBE	TPH (Gasoline)	TPH (Fuel Oil)	Corrosivity	Ignitability	Reactivity	TCLP Metals (8 RCRA)	Herbicides	Pest. / PCB	Semivolatiles	NOTES:
6949	2MW-1						\Box											
6950 6951 6952 6953 6953	zmw-z																	
6951	2 MW-3								<u></u>					,				· · · · · · · · · · · · · · · · · · ·
6952	2 MW-4												-					HAS-, AS
6953	Z YMW-5	•								··							-	
6954	2 BLANK						-	,										
												-						
lour		Date / Time	1 /	iceived Ú	1 .	M.	R	/ * ^ E		Comn	nent	s:						
Relinquish	ed By U	Date / Time	Re	ceived		- 1 		<u> </u>										
Relinquish	ed By	Date / Time	Re	ceived	by Lat	poratory	-	<u> </u>				•						

APPENDIX C HYDRAULIC CONDUCTIVITY TEST DATA

C.N. BROWN MW-3

TIME (seconds)	WATER LEVEL (feet)	DRAUDOUN (feet)	H/HO
	******		*******
15	14.43	4.05	.9806295
39	14.3	3.92	.9491527
70.2	14.2	3.82	.9249393
96	14.1	3.72	.9007267
135	14	3.62	.8765134
190.2	13.9	3,52	.8523004
315	13.8	3.42	.8280873
519	13.7	3.32	.803874

UNCONFINED AQUIFER

K = 0.2E-04 cm/sec

= 0.4 gpd/ft2

= 0.6E-06 ft/sec

= 0.1 ft/day

REGRESSION COEFFICIENT = -.9171606

C.N.BROWN MW-4

TIME (seconds)	WATER LEVEL (feet)	DRAWDOWN (feet)	H/HO
••	***********		
45	14.2	2.75	-8899672
75	14.1	2.65	.8576053
127.8	14	2.55	.8252425
175.2	13.9	2,45	.7928801
226.8	13.8	2.35	.7605178
292.8	13.7	2.25	.728155
349.8	13.6	2.15	.6957931
426	13.5	2.05	.6634302
499.8	13.4	1.95	.6310679
574.2	13.3	1,85	.5987055
645	13.2	1.75	.5663427
790.8001	13.1	1.65	-5339806
873.6	13	1.55	.501618
			· · - • -

1.45

.4692554

UNCONFINED AGUIFER

961.8001

K = 0.3E-04 cm/sec

= 0.7 gpd/ft2

= 0.1E-05 ft/sec

= 0.1 ft/day

REGRESSION COEFFICIENT = -.997723

12.9